Patent Claims

1. Correcting device to compensate for perturbations of the polarization distribution over the cross section of a light beam (10) in an optical system (56), having at least one correcting component (18; 118) which comprises a birefringent correcting element (22; 122; 222; 322) having two essentially parallel surfaces (26; 126, 127), between which the thickness (d) of the correcting element (22; 122, 222) is essentially constant,

characterized in that

the at least one correcting component (18, 118) comprises at least one further birefringent correcting element (20; 120a, 120b; 220; 320), which is assigned to the first correcting element (22; 122; 222; 322) and has two essentially parallel surfaces (24), in that at least one of the surfaces (24, 26; 126, 127) of at least one of the correcting elements (20, 22; 120a, 120b, 122; 220; 222; 320, 322) is reprocessed so as to create local thickness variations Δd by which the perturbations of the polarization distribution are compensated for at least approximately, and in that the arrangement, thickness (d) and birefringence properties of the correcting elements (20, 22; 120a, 120b, 122; 220; 222; 320, 322) are selected so that their birefringent effects cancel

each other out when the local thickness variations Δd are neglected.

2. Correcting device according to Claim 1, characterized in that the correcting elements (20, 22; 120a, 120b, 122; 220; 222; 320, 322) consist of the same material.

3. Correcting device according to Claim 2, characterized in that the surfaces (24, 26; 126, 127) of the correcting elements (20, 22; 120a, 120b, 122; 220; 222; 320, 322) are reprocessed complementarily with one another so that the total thickness (d_g) of all the correcting elements (20, 22; 120a, 120b, 122; 220; 222; 320, 322) of a correcting component (18; 118) is constant over its cross section.

4. Correcting device according to Claim 3, characterized in that the correcting component (18; 118) comprises two correcting elements, and in that the local thickness variation Δd required for the perturbation compensation at a particular point is distributed so that the thickness (d) of one correcting element (22) is reduced by $\Delta d/2$ at this point, and that of the other correcting element (20) is increased by $\Delta d/2$.

5. Correcting device according to one of the preceding claims, characterized in that the surfaces of the correcting elements (320, 322) are curved.

6. Correcting device according to one of the preceding claims, characterized in that the correcting component (18, 118) comprises two correcting elements (20, 22; 120a, 120b, 122; 220; 222; 320, 322) whose birefringence axes are mutually rotated by 90°.

7. Correcting device according to one of the preceding claims, characterized in that at least one correcting element (220) has a surface which is additionally reprocessed (40) so as to reduce wavefront errors due to the thickness variations.

8. Correcting device according to one of the preceding claims, characterized in that two correcting components (18, 220 and 222) are provided, the birefringence axes of the correcting elements (20, 22) of one correcting component (18) being rotated by 45° relative to the birefringence axes of the correcting elements (220, 222) of the other correcting component.

9. Projection objective for microlithography, having a correcting device (316) according to one of the preceding claims.

10. Projection objective according to Claim 9, characterized in that the correcting device (316) is arranged at least approximately in a pupil plane (72) of the projection objective (56).

11. Projection objective according to Claim 10, characterized in that the correcting device (316) is arranged in the immediate vicinity of an imaging mirror (68), which is contained in a catadioptric part of the projection objective (56).

12. Projection objective according to Claim 10 or 11, characterized in that a further correcting device according to one of Claims 1 to 8 is arranged at least approximately in a field plane of the projection objective (56).